REMARKS

Claims 1 and 8 were rejected as unpatentable over Beauducel in view of Palmer. Claims 2-4 and 11 were rejected as unpatentable over Beauducel in view of Palmer in view of Potratz. Claim 5 was rejected as unpatentable over Beauducel in view of Palmer in view of Scott. Claims 6-7 were rejected as unpatentable over Beauducel in view of AAPA. Claims 12 and 13 were rejected for purported lack of disclosure. Applicant requests reconsideration and continued examination.

The specification was amended to recite that the communication can be asynchronous. The specification clearly taught that there is no need for synchronous communication, which means that the binary modulated signal can be communicated by asynchronous communications. The specification taught that the prior systems used frame synchronization and coherent bit reclocking that is known as bit synchronization. The specification taught that no synchronization was required, and was amended to recite that the communication can be asynchronous. Claims 1 and 11 recite that the modulated binary signal has a pulse width duration that is representative of the analog input, and that the modulated binary signal is communicated asynchronously. Claims 12 and 13 were amended to recite that the communication is frame asynchronous, that is, with out framing words. New claims 14 and 15 were added to recite that the communication is bit asynchronous, that is, without a synchronous clock signal that is used for bit recovery upon coherent reception of the binary modulated signal.

The cited references Beauducel, Palmer, and Potratz teach synchronous communications.

Patentability depends on both the problem solved and the solution thereto. The problem solved is bit and frame synchronous communication of a digital signal presenting an analog signal. The solution thereto is a sigma-delta modulator providing a pulse width modulated binary signal that has a pulse width duration representative of the analog input and the use of a pulse width detector upon reception, so that, the modulated binary signal can be communicated asynchronously, without bit or frame synchronization.

The previous examination statement that Palmer teaches the sigma-delta modulators have been "USED WITH" a laser is devoid of specificity and articulated analysis as to how sigma-delta modulators are used with a laser in Palmer. That is, the examination fails to consider the explicit teachings of the cited references for what they fairly teach. Palmer teaches a sigma-delta modulator for generating a local oscillator clock signal that is used for modulating a laser output using a conventional modulator, whereas the present invention uses a sigma-delta modulator for modulating an input analog signal into a binary output signal that then drives a laser transmitter. Nowhere in Palmer is there a teaching to modulate an input analog signal by a sigma-delta modulator. The DIGITAL input signal that is to be transmitted in Palmer is first processed through elements 12, 14, 16, 18, and 20 where it is then modulated by multipliers 24 and 28, that are

conventional mixers, and summed by a summer 30, and then amplified by amplifier 32, modulated by modulator 36, and then finally transmitted using a laser transmitter 34. The local oscillator 26 provides the coherent clock modulation signal and is used to drive multiplier 24 and 28 as modulators. SIGNIFICANTLY, Palmer teaches that the local oscillator 26 can be a VCO, PLO, DRU, or a sigma-delta modulator. (Col.3 line 37-46) Hence, Palmer is teaching the use of a sigma-delta modulator as a local oscillator for driving a modulator. It would be helpful that the examination recognize and acknowledge the explicit teachings of the cited reference Palmer. Palmer teaches digital input signal modulation using multipliers 24 and 28. Palmer teaches using a sigma-delta modulator 26 for generating a local oscillator signal that drives the multipliers 24 and 28 as modulators. Palmer teaches away from using a sigma-delta modulator for modulating an analog input signal. The present invention teaches using a sigma-delta modulator for modulating an input analog signal. Palmer teaches the use of a local oscillator 26 for synchronized laser communications. The present invention solves the problem of synchronized laser communications. Palmer teaches away from the invention as to both the problem solved and the solution.

The examination then equates Palmer's teaching that a sigma-delta modulator can be used as a local oscillator within a laser communication system, with a vague teaching that the sigma-delta modulator can be "used with" a laser, and then with the present invention particular teaching that a sigma-delta modulator is used to modulate an analog input signal and directly drive a laser

transmitter with a binary signal, that solves the problem of synchronized laser communications. This improper equation is based on the teachings of the present invention, not Palmer, and hence, the unsupported interpretation of the teachings of Palmer is classical hindsight reconstruction and evinces nonobviousness.

The examination confuses hindsight reasoning with hindsight reconstruction. Hindsight reasoning looks to prior art teachings and determines whether those prior art teachings suggest the claimed combination. Forbidden hindsight reconstruction looks to claimed combination and finds prior art teachings of the elements of the claimed combination, and then, improperly combines the elements along the lines of the claimed invention without required prior art teachings to do so, and hence, improperly relies upon the teachings of the present invention. Here, the examination found that cited references suggest that the sigma-delta modulator drives a laser as in the present claims. This was learned from the present specification after the invention was made and not from Palmer. The examination, in hindsight, conveniently picks out a sigma-delta modulator and laser transmitter in Palmer, and then, improperly combines the sigma-delta modulator and laser transmitter of Palmer along the lines of the present invention, directly contrary to the teachings of Palmer and directly contrary to the combined teachings of Palmer and Beauducel. The examination then asserts that Palmer teaches that a sigma-delta modulator can be "used with" a laser transmitter. Palmer uses a sigma-delta modulator to merely generate a local oscillator signal, which, in and of itself, does not modulate an analog input signal nor directly drive a laser

transmitter, as gleaned from the present invention that does use the sigma-delta modulator to modulate an analog input signal for generating a binary signal driving a laser transmitter for enabling asynchronous communication.

The examination failed to consider both the problem solved and the solution thereto. The examination must recognize that obviousness is a two-part analysis as to suggesting both the problem solved and the solution thereto. That is, the examination is completely silent on how the cited references teach the synchronization problem. When the cited references do not teach the problem solved, the cited references cannot possibly teach a solution thereto. The examination should at least acknowledge that the cited references only teach synchronous communications. The examination failed to recite any text in the cited references that teach specifically how the sigma-delta modulator in Palmer is to be combined with a laser to provide asynchronous communication.

While the examination may be able to locate isolated teachings of claimed elements, the combination of these elements along the lines of the claimed invention to solve the problem solved must be taught in the cited references, as it is the cited references that provide knowledge of one skilled in the art. When the examination attempts to combine prior art teachings and elements, contrary to the explicit teachings of those cited references, the examination is a product of tortured reasoning that is the hallmark of nonobviousness.

Obviousness is determined from the prior art as a whole, fairly read for what it fairly teaches as to the cooperative combination of these parts as particularly claimed, as to both the problem solved and the solution thereto.

The discussion is focused on claim 1. The invention solves the problem of required synchronized transmissions of laser signals. (See discussion of framing requirements in the background section of the application, for example on page 3 where it states that "These synchronization frames words are overhead data and are typically one to ten percent of the information data words.") The cited references do not solve the synchronized transmission problem. If the cited references do not teach the problem solved, the cited references cannot possibly teach the solution thereto. The examination did not indicate how the cited references suggested the problem solved. The solution is the use of the sigma-delta modulator for modulating an analog input signal and for driving a laser transmitter with a digital binary signal, for solving the problem of required synchronized self-clocking communications. This sigma-delta modulator, in the preferred form, provides a transmitted binary signal that is not self-clocking with synchronized transitions nor used with synchronized frame words. Claim 1 particularly recites the cooperative elements, a sigma-delta modulator driving a laser transmitter communicating a binary laser signal. This combination need not employ synchronized laser communications, the problem solved, but rather can be used

asynchronously, as a significant advancement in the art, properly deserving of patent protection.

The examination cites three references for rejecting claim 1, incorrectly suggesting that these two cited references suggest the combination of a sigma-delta modulator for driving a laser transmitter for communicating the binary modulated laser signal. Particularly, the examination clearly states: "Beauducel et al does not specify a modulated binary laser signal", and "Palmer et al teaches a communication system wherein a sigma-delta modulator is used with a laser transmitter". This is where the examination attempts to use forbidden hindsight reconstruction, specifically through the use of the phrase "used with". The phrase "used with" is where the examination attempts to combine prior art elements, a sigma-delta modulator generating a clock signal and a laser transmitter, along the lines of the present invention where the sigma-delta modulator particularly modulates an analog input signal for generating a binary signal for particularly driving a laser transmitter, without a suggestion to do so, as a strong indication of improper hindsight reconstruction, and is where the examination attempts to combine prior art elements through tortured reasoning, which is strong evidence of nonobviousness.

This improper hindsight reconstruction becomes even more apparent when the improperly suggested combination of the cited references cannot possibly be combined consistent with their teachings along the lines of the claimed invention. Palmer uses a

sigma-delta modulator to generate a local clocking signal for synchronized communications in a laser communication system. Surely, the examination should recognize the difference between a local oscillator and an input signal modulator. While the sigma-delta modulator is "used-with" a laser transmitter, the sigma-delta modulator is merely used to generate a local oscillator clock signal, such as the clock signal generated by Beauducel's "SYNCHRONIZATION ELEMENT" 5. The sigma-delta modulator used in Beauducel and in the present invention is used to provide a modulated signal, whereas the sigma-delta modulator in Palmer does not, and is only used to generate a high-speed synchronization local oscillator clock signal. ("Alternatively, fractional frequency dividers using sigma-delta modulation of the feedback divider may be USED FOR THE GENERATION OF SUB-INTER MULTIPLES OF THE BASE FREQUENCY", Palmer Col. 3 line 44) Hence, it must be clearly understood that Palmer does not teach using a sigma-delta modulator for modulating the analog input, but rather uses a sigma-delta modulator for generating a digital clock signal for clocking a modulator. Though the term "used with" may be grossly accurate, that surely fails to focus the discussion on how the sigma-delta modulator is actually used in Palmer, for what Palmer fairly teaches.

Palmer teaches synchronized laser communications, the very problem the present invention solves. With kind due respect, Palmer is irrelevant to an obviousness rejection. Perhaps applicant can be of assistance.

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SIGNIFICANTLY, the combination of Palmer and Beauducel, for what they fairly teach, is to replace the synchronization element 5 of Beauducel with a sigma-delta modulator of Palmer for generating the local oscillator synchronization signal. Hence, the claimed combination solution is clearly NOT remotely suggested by the combination of the cited references, and surely does not solve the problem solved of required synchronization. As such, the combination of Palmer and Beauducel teaches synchronized nonbinary laser communications and teaches away from the present invention. Also, the problem solved is not remotely suggested by the cited references. Beauducel specifically teaches SYNCHRONIZED communications using the synchronization element 5. Further, the coding circuit 6 is used to code the signal with a synchronization clock signal. "the stream of 1-bit words coming from the (sigma-delta) modulator 4 is applied directly here to a coding circuit 6 applying a predetermined coding allowing a clock signal to be conveyed at the same time as the signals, …, suited to an optical type transmission". Beauducel specifically teaches away from the use of binary signal. Hence, Beauducel teaches non-binary synchronized communications, the very problem that the present invention solves. Palmer teaches a system for use in an OC-XX or a STS-XX SYNCHRONOUS OTPICAL NETWORK. Hence, Palmer also teaches synchronized optical communications that coincidentally uses a sigma-delta modulator to generate a local oscillator clock signal. Hence, the combination of Beauducel and Palmer does not suggest using a sigma-delta modulator for directly modulating an analog input into an output binary data stream for driving a laser transmitter. Hence, both Beauducel and Palmer teach optical

SYNCHRONOUS communication, and do not remotely suggest the problem solved, and as such, cannot possibly suggest the solution thereto, as presently claimed. In fact, the cited references teach just the opposite of the present invention.

The examination states that Beauducel teaches that different transmitters can be used, and "Based on this, the examiner turns to Palmer to show that it is well known in the art to combine a sigma delta modulator and a laser in an optical transmission system". This is the classical BAG-OF-PARTS rejection based upon forbidden hindsight reconstruction, as it is devoid of any discussion on how the sigma-delta modulator in Palmer is actually "used with" the laser system, and how it can be combined with Beauducel. When one fairly reads Palmer, it is clear that the sigma-delta modulator is not modulating the analog input for driving a laser modulator, but rather is merely used for generating a clock for synchronously driving the data stream modulator that in turn drives the laser transmitter. The cited references teach synchronous communications. The inventor here has proceeded directly contrary, and hence, the cited references are strong evidence of nonobviousness.

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Potratz teaches the use of a sigma-delta modulator for providing a pulse width modulated signal that is representative of an analog signal. This is well known prior art. Potratz uses the signal with respect to a clock under timing of Figure 4B. To perfect synchronized detections, a 10MHz clock is used. For communication purposes, the interface provides the CPU with a multibit resolution signal representative of the transmittance of red and infrared light from LED 16 and 18. The multibit resolution signal is not a pulse width modulation signal having a pulse width duration representative of an analog input. Potratz teaches the use of synchronized detections and multibit resolution, and hence teach away from the present invention.

Potratz taught pulse width modulation of a binary signal where the pulse width is representative of an analog signal, which binary signal is converted into a clocked multibit resolution digital signal for synchronized communications to a CPU. Beauducel taught using sigma-delta modulator and a synchronizing element (5) to generate a modulated binary signal representative of an analog signal for synchronized communications. Palmer taught using a VCO 26 for modulating a laser signal to provide bit-synchronized communication.

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The cited references do not suggest using a sigma-delta modulator for modulating an analog input into a binary signal for asynchronous laser communications. The cited references do not suggest the problem of asynchronous laser communications, the problem solved by the present invention, as both of the cited references teach synchronous communication, and as such, cannot possibly suggest the problem solved or the solution thereto. The cited references do not suggest the claimed invention that uses a sigma-delta modulator for converting an analog input signal into a binary signal for laser communications for solving the problem of synchronous laser communications.

On the contrary, the cited references positively teach synchronized communications, and no combination of these references can possibly teach or suggest asynchronous communication. Particularly, the cited references do not teach nor suggest translating an analog signal into a pulse width modulated signal having a pulse duration representative of the analog signal for providing a modulated binary signal that is asynchronously communicated and detected using pulse width detection. Applicant requests allowance of the claims.

Respectfully Submitted

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